

AMENDMENTS TO THE CLAIMS

Listing of Claims:

1. (Currently Amended) A process for selectively hydrogenating a highly unsaturated hydrocarbon to a less unsaturated hydrocarbon in an olefin rich hydrocarbon stream comprising introducing into a reactor a hydrocarbon fluid stream comprising a highly unsaturated hydrocarbon and a sulfur impurity in the presence of hydrogen and a catalyst composition under conditions effective to convert said highly unsaturated hydrocarbon to a less unsaturated hydrocarbon;

said catalyst composition comprising palladium, silver, potassium, and an inorganic support material, wherein the catalyst composition contains less than ~~about~~ 0.3 weight % potassium, wherein a molar ratio of ~~potassium to fluoride~~ to potassium is less than 2:1.

2. (Original) The process according to claim 1, wherein the potassium component is derived from potassium fluoride.

3. (Canceled)

4. (Currently Amended) The process according to claim 1, wherein a molar ratio of ~~potassium to fluoride~~ to potassium is equal to or less than 1:1.

5. (Original) The process according to claim 1, wherein said catalyst composition contains less than 0.2 weight % potassium.

6. (Original) The process according to claim 4, wherein said catalyst composition contains 0.1 weight % potassium.

7. (Original) The process according to claim 1, wherein said silver is selected from the group consisting of silver oxide and silver metal.

8. (Original) The process according to claim 1, wherein said inorganic support material is selected from the group consisting of alumina, silica, titania, zirconia, aluminosilicates, zinc aluminate, zinc titanate, and mixtures thereof.

9. (Original) The process according to claim 8, wherein said inorganic support material is alumina.

10. (Original) The process according to claim 1, wherein the palladium content is 0.01-1 weight %, the silver content is 0.01-10 weight %, and the fluorine content is 0.01-1.5 weight %.

11. (Original) The process according to claim 10, wherein the palladium content is 0.01-0.2 weight %, the silver content is 0.02-2 weight %, and the fluorine content is 0.05-0.4 weight %.

12. (Original) The process according to claim 1, wherein said highly unsaturated hydrocarbon is selected from the group consisting of diolefins, alkynes, and mixtures thereof.

13. (Original) The process according to claim 12, wherein said diolefin is selected from the group consisting of propadiene, 1,2-butadiene, 1,3-butadiene, isoprene, 1,2-pentadiene, 1,3-pentadiene, 1,4-pentadiene, 1,2-hexadiene, 1,3-hexadiene, 1,4-hexadiene, 1,5-hexadiene, 2-methyl-1,2-pentadiene, 2,3-dimethyl-1,3-butadiene, heptadienes, methylhexadienes, octadienes, methylheptadienes, dimethylhexadienes, ethylhexadienes, trimethylpentadienes, methyloctadienes, dimethylheptadienes, ethyloctadienes, trimethylhexadienes, nonadienes, decadienes, undecadienes, dodecadienes, cyclopentadienes, cyclohexadienes, methylcyclopentadienes, cycloheptadienes, methylcyclohexadienes, dimethylcyclopentadienes, ethylcyclopentadienes, dicyclopentadiene, and mixtures thereof.

14. (Original) The process according to claim 13, wherein said diolefin is selected from the group consisting of propadiene, 1,3-butadiene, 1,3-pentadiene, 1,4-pentadiene, isoprene, 1,3-cyclopentadiene, dicyclopentadiene, and mixtures thereof.

15. (Original) The process according to claim 14, wherein said diolefin is propadiene.
16. (Original) The process according to claim 12, wherein said alkyne is selected from the group consisting of acetylene, propyne, 1-butyne, 2-butyne, 1-pentyne, 2-pentyne, 3-methyl-1-butyne, 1-hexyne, 1-heptyne, 1-octyne, 1-nonyne, 1-decyne, and mixtures thereof.
17. (Original) The process according to claim 16, wherein said alkyne is selected from the group consisting of acetylene, propyne, and mixtures thereof.
18. (Canceled)
19. (Previously Presented) The process according to claim 1, wherein said sulfur impurity is a sulfur compound selected from the group consisting of hydrogen sulfide, carbonyl sulfide (COS), carbon disulfide (CS₂), mercaptans (RSH), organic sulfides (R-S-R), organic disulfides (R-S-S-R), organic polysulfides (R-S_n-R, n where >2), thiophene, substituted thiophenes, organic trisulfides, organic tetrasulfides, and mixtures thereof, wherein R represents an alkyl or cycloalkyl or aryl group containing 1 carbon atom to 10 carbon atoms.
20. (Currently Amended) A process comprising introducing into a reactor, from a depropanizer fractionation tower, a fluid stream comprising a sulfur impurity, an alkyne and optionally a diolefin, in the presence of hydrogen and a catalyst composition, under conditions effective to convert said diolefin and alkyne to their corresponding monoolefins;
said catalyst composition comprises palladium, a silver component, a potassium compound, and an inorganic support material; wherein said catalyst composition contains less than ~~about~~ 0.3 weight % potassium, and a molar ratio of ~~potassium to~~ fluoride to potassium is less than 2:1;
said diolefin is selected from the group consisting of propadiene, 1,3-butadiene, 1,3-pentadiene, 1,4-pentadiene, isoprene, 1,3-cyclopentadiene, dicyclopentadiene, and mixtures thereof;

said alkyne is selected from the group consisting of acetylene, propyne, 1-butyne, 2-butyne, 1-pentyne, 2-pentyne, 3-methyl-1-butyne, 1-hexyne, 1-heptyne, 1-octyne, 1-nonyne, 1-decyne, and mixtures thereof;

said inorganic support material is selected from the group consisting of alumina, silica, titania, zirconia, aluminosilicates, zinc aluminate, zinc titanate, and mixtures thereof.

21. (Canceled)

22. (Currently Amended) The process according to claim 20, wherein the molar ratio of ~~potassium~~ to fluoride to potassium is equal to or less than 1:1.

23. (Original) The process according to claim 20, wherein said catalyst composition contains less than 0.2 weight % potassium.

24. (Original) The process according to claim 23, wherein said catalyst composition contains 0.1 weight % potassium.

25. (Original) The process according to claim 20, wherein said silver component is selected from the group consisting of silver oxide and silver metal.

26. (Original) The process according to claim 20, wherein the palladium content is 0.01-1 weight %, the silver component is 0.01-10 weight %, and the fluorine content is 0.01-1.5 weight %; and

said highly unsaturated hydrocarbon is selected from the group consisting of acetylene, propadiene, 1,3-butadiene, 1,3-pentadiene, 1,4-pentadiene, isoprene, 1,3-cyclopentadiene, dicyclopentadiene, and mixtures thereof.

27. (Original) The process according to claim 26, wherein the palladium content is 0.01-0.2 weight %, the silver component is 0.01-2 weight %, and the fluorine content is 0.05-0.4 weight %.

28. (Canceled)

29. (Currently Amended) The process according to claim 20, wherein said sulfur impurity is a sulfur compound selected from the group consisting of hydrogen sulfide, carbonyl sulfide (COS), carbon disulfide (CS₂), mercaptans (RSH), organic sulfides (R-S-R), organic disulfides (R-S-S-R), organic polysulfides (R-S_n-R, n where >2), thiophene, substituted thiophenes, organic trisulfides, organic tetrasulfides, and mixtures thereof, wherein R represents an alkyl or cycloalkyl or aryl group containing 1 carbon atom to 10 carbon atoms.

30. (Currently Amended) A selective hydrogenation process comprising introducing into a reactor, from a depropanizer fractionation tower, a fluid stream comprising a diolefin and acetylene, in the presence of a sulfur impurity, with a catalyst composition under conditions effective to convert said diolefin and acetylene to their corresponding monoolefins

said catalyst composition comprises a palladium-containing material selected from the group consisting of palladium metal, palladium oxides, and mixtures thereof, a silver component, an alkali metal fluoride, and an inorganic support material;

said alkali metal fluoride is potassium fluoride and said inorganic support material is selected from the group consisting of alumina, silica, titania, zirconia, aluminosilicates, zinc aluminate, zinc titanate, and mixtures thereof;

said catalyst composition contains 0.01 to 1 weight % palladium, 0.005 to 2 weight % of a silver component, 0.05-0.4 weight % fluorine; and less than ~~about~~ 0.3 weight % potassium, and wherein a molar ratio of ~~potassium to~~ fluoride to potassium is less than 2:1;

said process is carried out at a temperature in the range of 30 to 200°C and under a pressure in the range of 15 to 2000 pounds per square inch gauge (psig).

31. (Canceled)

32. (Currently Amended) The process according to claim 30, wherein the molar ratio of ~~potassium to~~ fluoride to potassium is equal to or less than 1:1.

33. (Original) The process according to claim 30, wherein said catalyst composition contains less than 0.2 weight % potassium.
34. (Original) The process according to claim 33, wherein said catalyst composition contains 0.1 weight % potassium.
35. (Original) The process according to claim 30, wherein said inorganic support material is alumina.
36. (Previously Presented) The process according to claim 30, wherein said sulfur impurity is a sulfur compound selected from the group consisting of hydrogen sulfide, carbonyl sulfide (COS), carbon disulfide (CS₂), mercaptans (RSH), organic sulfides (R-S-R), organic disulfides (R-S-S-R), organic polysulfides (R-S_n-R, n where >2), thiophene, substituted thiophenes, organic trisulfides, organic tetrasulfides, and mixtures thereof, wherein R represents an alkyl or cycloalkyl or aryl group containing 1 carbon atom to 10 carbon atoms.
37. (New) The process according to claim 1, wherein said catalyst composition contains less than 0.2 weight % potassium.
38. (New) The process according to claim 1, wherein said catalyst composition contains less than 0.1 weight % potassium.
39. (New) The process according to claim 1, wherein selectivity to ethane for the process is equivalent to or reduced in comparison to a process employing a catalyst having equal to or greater than 0.3 weight percent potassium, a fluoride to potassium molar ratio of equal to or greater than 2:1, or both.
40. (New) The process according to claim 1, wherein selectivity to ethane is less than 100 mole %.

41. (New) The process according to claim 1, wherein selectivity to ethylene for the process is equivalent to or increased in comparison to a process employing a catalyst having equal to or greater than 0.3 weight percent potassium, a fluoride to potassium molar ratio of equal to or greater than 2:1, or both.

42. (New) The process according to claim 1, wherein selectivity to ethylene is greater than 0 mole %.

43. (New) The process according to claim 1, wherein $T1_{cos}$ for the process is reduced in comparison to a process employing a catalyst having equal to or greater than 0.3 weight percent potassium, a fluoride to potassium molar ratio of equal to or greater than 2:1, or both.